

# Surveillance

## Dell EMC Storage with Aimetis Symphony

### Configuration Guide

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REV 3.1



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# CHAPTER 1

## Introduction

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## Business Case

This document outlines how Aimetis Symphony video management installations can benefit from using a Dell EMC storage solution, and provides configuration and sizing guidelines for virtualized Aimetis Symphony installations on Dell EMC storage.

This solution uses Dell EMC Isilon™ scale-out clusters and EMC VNX™ storage arrays as storage platforms for a virtualized Aimetis Symphony video management solution. VMware vSphere provides the virtualization platform, with VMware ESXi hosts implementing the Symphony servers. Dell EMC storage hardware and software solutions are ideal for storing, consolidating, protecting, and backing up video and audio data.

## Overview

This document provides guidelines for determining the optimum configuration for an Aimetis Symphony system.

The document provides guidelines for storage platform positioning and system design, based on performance testing.

Guidelines discussed in this document include:

- The number of Symphony servers (server instances in VMware) required for a system, based on the maximum per server bandwidth
- The optimum mix of Isilon nodes and Symphony servers based on the expected bandwidth in an Isilon implementation

All performance data contained in this report was obtained in a rigorously controlled environment. Performance varies depending on your specific hardware and software and may be different from what's outlined here.

## Audience

The intended audience for the document includes Dell EMC integrators, presales personnel, and partners.

The intention of this Configuration Guide is to help Dell EMC field personnel understand the required tasks for a successful installation.

This solution assumes that the reader is using this document along with an established architecture based on the Dell EMC Sizing Guide.

This solution also makes the assumption that the reader is familiar with installing and configuring VMware and Microsoft Windows operating systems.

# CHAPTER 2

## Configuring the solution

This chapter presents the following topics:

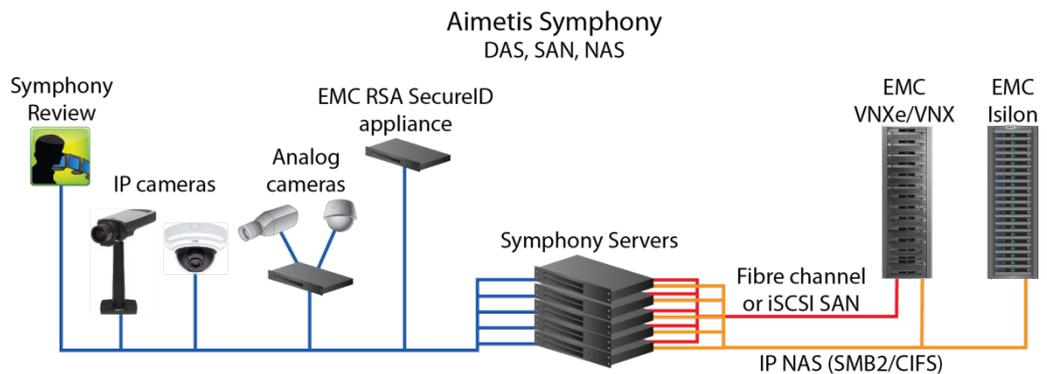
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## Aimetis Symphony architecture

There are many design options for an Aimetis Symphony solution in addition to unicast and multicast considerations.

The solution architecture, as shown in the figure below, represents a typical architecture, with users and cameras on a common IP network and storage on an isolated IP network. Another common implementation includes a camera-specific network. This section introduces the system architecture for an Aimetis Symphony solution.

**Figure 1** Aimetis solution architecture



The following table shows the version of Aimetis Symphony that was tested.

**Table 1** Aimetis Symphony versions

Model	Aimetis Symphony version
VNX-VSS100	6.12.3.0
VNX5400	6.12.3.0
NL400 (OneFS 7.1.0.0)	6.12.3.0
X410 (OneFS 8.0.0.1)	6.14.5.1

## EMC VNX

VNX storage is ideal for recording and managing terabytes of video from distributed locations. This section describes best practices for configuring a VNX storage system for this solution.

The VNX family includes the VNX and VNX-VSS series arrays. The VNX series is designed for midtier to enterprise storage environments, is ideal for distributed environments, and can scale to handle large petabyte (PB) environments with block-only requirements at central locations.

## Isilon (NAS)

The Isilon scale-out network-attached storage (NAS) platform combines modular hardware with unified software to harness unstructured data. Powered by the

distributed Isilon OneFS™ operating system, an Isilon cluster delivers a scalable pool of storage with a global namespace.

The platform's unified software provides centralized web-based and command-line administration to manage the following features:

- A symmetrical cluster that runs a distributed file system
- Scale-out nodes that add capacity and performance
- Storage options that manage files and tiering
- Flexible data protection and high availability
- Software modules that control costs and optimize resources

## Data protection

In the Isilon N+M data protection model, N represents the number of nodes, and M represents the number of simultaneous node, drive, or a combination of node and drive failures that the cluster can withstand without incurring data loss. N must be larger than M.

Isilon OneFS supports N+1, N+2, N+3, and N+4 data protection schemes, and up to 8x mirroring. OneFS also supports several hybrid protection schemes. These include N+2:1 and N+3:1, which protect against two drive failures or one node failure, and three drive failures or one node failure, respectively.

The following best practices are based on a five-node minimum cluster size. You can use cluster sizes as small as a three-node cluster, but Dell EMC does not recommend this.

- Our five-node cluster lab tests were based on the Isilon recommended +2:1 protection level for this node count range. Larger node-count clusters have more disks, which cause an increase in the possibility of multiple disk failures. For larger clusters, consult the Isilon team or your Isilon representative for appropriate protection schemes: N+2:1, N+2, N+3, or N+4.
- Include a minimum free space calculation for proper cluster sizing. Dell EMC recommends a cluster size that enables a node to be removed, while retaining a minimum of 10 percent free space in the remaining capacity. This free space ensures that node removal and node failures have minimal or no impact on video ingestion.

An Isilon sizing tool provides a more accurate calculation. You can find this tool at <https://isilon-lawndart.herokuapp.com/pools/search>. Other sizing tools are available for sizing bandwidth and storage capacity needed.

## Data protection

OneFS applies protection at the file-level. This enables the cluster to recover data quickly and efficiently. Nodes, directories, and other metadata are protected at the same level as the data blocks they reference or at a higher level. Because all data, metadata, and forward error correction (FEC) blocks are striped across multiple nodes, there is no requirement for dedicated parity drives.

OneFS uses the Reed Solomon algorithm for N+M protection. In the N+M data protection model, N represents the number of nodes, and M represents the number of simultaneous node, drive, or node and drive failures, that the cluster can withstand without incurring data loss. N must be larger than M. OneFS supports N+1, N+2:1, N+2, N+3:1, N+3, and N+4 data protection schemes. OneFS also supports up to eight mirrors; however, we did not test mirroring for this solution.

## OneFS version

For all video management systems, Dell EMC recommends using OneFS 7.0 or later. We did not test OneFS releases prior to 7.0.

We tested Aimetis Symphony with OneFS 7.1 on NL400 nodes. NL400 is the lowest performing, highest capacity of the 400 series.

## SmartConnect

SmartConnect™ provides load balancing and failover capabilities for connections to the Isilon cluster, and is optional but highly recommended.

Although we did not enable SmartConnect during solution testing, SmartConnect is an option that you can use with Aimetis Symphony.

With SmartConnect, all Symphony servers use a single fully qualified domain name (FQDN) or Universal Naming Convention (UNC) path for video storage access. SmartConnect provides load balancing when the connection to the cluster is made and simplifies installation.

SmartConnect Basic and SmartConnect Advanced use DNS delegation to distribute SMB connections between Isilon nodes based on a selected load balancing policy. SmartConnect Advanced requires an additional license.

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### Note

In all cases use the default load balancing policy: Round-robin, unless directed otherwise by your Isilon account team. The round-robin algorithm is included in SmartConnect Basic, which does not require an additional license.

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Round-robin distributes connections across all NICs in the SmartConnect pool. The connection distribution is at the NIC level and not the SmartConnect pool level, which is important because the round-robin algorithm does not recognize different SmartConnect pools. Therefore the physical security video repository SmartConnect IP pool and a second SmartConnect IP pool for InsightIQ, administrative access, or even PING, share the NIC connection assignment with the same round-robin basic.

SmartConnect Advanced adds the ability to create multiple pools per subnet, which might be important in many implementations.

## SmartQuotas (recommended)

Dell EMC Isilon SmartQuotas™ enables administrators to limit the storage used for each Symphony server, and presents to the server a view of available storage based on the assigned quota. SmartQuotas enables each Symphony server to calculate its available disk space and react correctly.

Without SmartQuotas, the administrator must anticipate the total write rate to the cluster and adjust the Symphony retention policies accordingly. A miscalculation could result in video loss. SmartQuotas resolves the issues caused by manual calculations.

SmartQuotas eliminates issues that may occur with each Aimetis (VMS) server having access to the full Isilon OneFS file system. It is possible to run without SmartQuotas, but not recommended.

Configure SmartQuotas when more than one Symphony server is writing to the Isilon cluster or when the cluster is shared with other users. Enable SmartQuotas and define a quota for each share or directory.

SmartQuotas setup requires the following configuration changes:

- Configure a hard share-limit threshold for the video file repository.
- Configure OneFS to show and report the available space as the size of the hard threshold.
- Set the usage calculation method to show the user data only.

## Cluster size

We tested this solution using a five-node cluster. A five-node cluster is the minimum cluster size that Dell EMC recommends.

Three or four node clusters can be implemented, but these will not achieve the level of performance outlined in this document, and cannot sustain failures correctly.

The Isilon team recommends a +2:1 protection level for five-node clusters. Larger clusters have an increased possibility of disk failures. For these clusters, use N+2, N+3, or N+4, according to the Isilon team's recommendations.

The best way to size a cluster is to use the [Isilon Cluster Sizing Tool](#).

Other tools to make capacity calculations are also available from the camera vendors, or the video surveillance manager vendor, when estimates of the bandwidth and storage capacity are needed.

If tools other than the [Isilon Cluster Sizing Tool](#) are being used for sizing aggregate capacity, Dell EMC recommends that, in steady state, the capacity does not exceed 85% of the total usable space capacity, and during a worst case scenario the capacity does not exceed 90%. The optimal protection scheme for the implementation affects these calculations. Contact your Dell EMC representative for assistance to determine the right protection scheme for your environment.

## Isilon configuration guidelines

Isilon configuration sizing guidelines are based on the solution test results.

The statistics collected were based on various failure scenarios that we introduced during testing. These scenarios included node failure and recovery and disk-drive rebuilds to ensure that all sizing calculations were based on a worst-case scenario. See *Dell EMC Storage with Aimetis Symphony: Sizing Guide* for more information about the test scenarios and results.

We tested the Isilon nodes with both GbE and 10 GbE NICs; jumbo frames were not used. The test results indicated that each GbE interface can accommodate up to two Symphony server (SMB/CIFS) connections. A single 10 GbE interface can accommodate up to four Symphony servers per Isilon NIC.

The *Aimetis Symphony 6.0 Administration Guide* outlines how to configure Symphony to use NAS and interface with Isilon storage. Primary configuration elements include:

- Setting up the user name and password for NAS access from the Symphony servers. The use of Microsoft Active Directory for Isilon clusters and Symphony servers requires that you specify the Symphony Administrator user both in the installation setup for Symphony and in the OneFS GUI ( **Access > Users**). This ensures that the user has full access to the directories used by the Symphony servers.
- Setting up the UNC path for the Isilon cluster or node as the path for storage. The use of FQDN allows for node failure.

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**Note**

We tested only one concurrent path. The use of multiple paths is likely to result in the same limitations to per server bandwidth.

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- Configuring overload protection for the servers. This feature enables Symphony servers to move cameras to other servers in the same redundancy group to avoid CPU overload.  
We did not evaluate this feature during solution testing. However, if the bandwidths per server are within the specified totals, the system will operate with no video recording issues.
- Deploying video analytics. The video analytics capabilities that Symphony offers are significantly differentiated in the market. However, the additional processing for analytics affects the I/O capabilities per server.

We did not test the effects of analytics on server performance because the complexity of the analytics and how often they are performed is site dependent and impossible to adequately anticipate in a test environment. When deploying analytics, Dell EMC recommends that you work with your Aimetis representative to determine the bandwidth and camera density per Symphony server.

## Configuring authentication and access control

We conducted authentication and access control tests to determine the best method for shared access.

The following three tests were conducted:

### Full Active Directory (recommended)

Where the Symphony server and the Isilon cluster are part of the same Windows domain.

### Partial Active Directory

Where the Symphony servers are part of the Windows domain, but the Isilon cluster is administered locally.

### Fully locally administered control

Where the Symphony servers and the Isilon cluster are administered locally.

Alternatives to the previous methods might exist, but the Dell EMC Surveillance Lab team does not plan to derive or support other methods.

### Procedure

1. Select **Cluster Management > Access Management**.
2. Select **Access zone** and ensure that the **System access zone** has the provider status **Active Directory, Local, and File** marked with a green dot.
3. Under **Active Directory**, select **Join a domain** and add the Windows domain and appropriate users using one of the following options:
  - When the Isilon cluster and Aimetis are not part of the same domain, set the shares to **Run as Root**. This setting is not ideal from a security perspective.
  - When the Isilon cluster and Symphony server are part of the same domain, configure the **DVM Camera** service to use the Domain account with read/write permissions to the Isilon cluster share. During the initial installation of the camera server, use the Symphony administrator account specification

wizard to configure the camera service. Specify the recording location for the camera server using the full UNC path of the Isilon share.

## Releases tested

The following tables list the firmware builds and software releases used for our tests.

**Table 2** Firmware builds

Model	Firmware
VNXe1600	VNXe OE 3.1.3.5754151
VNXe3200	VNXe OE 3.1.3.5754151
VNXe3300	VNXe OE 2.1.0.14097
VNX-VSS100	VNX OE 5.32.000.5.215
VNX5200	VNX OE 5.33.008.5.119
VNX5400	VNX OE 5.33.000.5.015
VNX5600	VNX OE 5.33.000.5.052

**Table 3** OneFS releases

Model	Firmware
NL400	7.0.x
NL410	7.2.1
HD400	7.2.1
X410	8.0.0.1

**Table 4** Aimetis Symphony releases

Release	Subrelease
Aimetis Symphony	6.12.3.0; 6.14.5.1



# CHAPTER 3

## Conclusion

This chapter presents the following topics:

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## Summary

Dell EMC carried out comprehensive testing with Aimetis Symphony and Dell EMC Isilon clusters or an EMC VNX5400 storage array. The results show that Aimetis Symphony is ideally suited for either Isilon scale-out storage or VNX storage arrays.

The Aimetis architecture and product suite enables extreme scaling from a few cameras to tens of thousands of cameras with Dell EMC storage.

### VNX storage arrays findings

Aimetis Symphony performance to the VNX5400 array was exceptional, with high write bandwidths and video review causing low overhead to the array.

We tested a 30-disk pool configuration as this provides a good compromise between a lower performing pool with less disks and a higher performing pool with more disks. In general, pools with less than 30 disks have a steeper performance drop-off, while pools with more than 30 disks have a more gradual performance increment.

Based on our test results, the VNX5400 with a full complement of disk drives should be able to exceed 450 MB/s.

### Dell EMC Isilon scale-out storage findings

Dell EMC Isilon scale-out storage is ideal for both mid tier and enterprise customers.

An Isilon cluster is based on independent nodes working seamlessly together to present a single file system to all users. You can configure licensed SmartQuotas options so that each server view of the storage is based on an assigned quota and not the entire file system. In our tests, we found this feature to be required for a successful disk rebuild and for various node removal tests. Dell EMC recommends using SmartQuotas.